

A proposal for creating a maximum seismic intensity map of past damaging earthquakes

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The Headquarters for Earthquake Research Promotion of Japan has created and published national seismic hazard maps, in principle, every year after the 1995 Hyogo-ken Nanbu earthquake. This hazard map has two problems. One is that probabilities cannot be easily understood by citizens. The other is that the method includes large uncertainties and has not been inadequately tested yet. The results, therefore, are less reliable.

We propose creating a maximum seismic intensity distribution of past damaging earthquakes. This maps may be easily understood by citizens, the method has small uncertainties and the result is more reliable. The distribution is two-dimensional and is enable citizens to know the maximum seismic intensity at their own backyard. The previous seismic intensity maps for historical earthquakes show the intensity only at the observation point, and the citizens cannot know the intensity at their own backyard.

Citizens in areas of large intensities may have a conscious to earthquakes. However, we should inform citizens in areas of small intensities that the area may not be safe in the future. It is preferable that this maps is supplementally used.

This study develops a map in Kumamoto prefecture for damaging earthquakes after the Meiji era as a prototype. We applied attenuation relationships for seismic intensity (Morikawa et al., 2010). We use fault planes if faults is estimated or hypocenters if the fault plane is not estimated to calculate distances in the equation. We also use the elevation data of the National Land Numerical Information download service to calculate distances. We use data of average shear-wave velocity in the upper 30 m distributed by the Japan Seismic Hazard Information Station. We estimate seismic intensity at each block of 250 m mesh for each earthquake and plot the maximum intensity at each block.

Seismic intensity of 4 (in JMA scale) are distributed in the most of Kumamoto prefecture due to the 1946 Nankai (M8.0) and 1968 Hyuganada (M7.5) earthquakes. High intensity (5 lower-6 higher) are distributed around Kumamoto city due to the 1889 Kumamoto earthquake (M6.3).

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